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Search History

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END OF SEARCH HISTORY

L7: Entry 1 of 1 File: USPT Apr 16, 1996

DOCUMENT-IDENTIFIER: US 5508594 A
TITLE: Electric vehicle chassis controller

Detailed Description Text (3):
As shown in FIG. 1, there is provided an electric vehicle propulsion system 10 comprising a system control unit 12, a motor assembly 24, a cooling system 32, a battery 40, and a DC/DC converter 38. The system control unit 12 includes a cold plate 14, a battery charger 16, a motor controller 18, a power distribution module 20, and a chassis controller 22. The motor assembly 24 includes a resolver 26, a motor 28, and a filter 30. The cooling system 32 includes an oil pump unit 34 and a radiator/fan 36.

Detailed Description Text (11):
The resolver 26 is illustrated in FIG. 6B and is positioned proximate to the motor 28 for detecting the angular position of the motor shaft and for providing signals indicative Of the angular position of the motor shaft to the motor controller 18. The reference signal line R.sub.1 connected to the resolver is for a positive or negative reference value indicating the angular position of the motor shaft. The S.sub.1 signal line from the resolver provides a positive or negative sine value for the angular position of the motor shaft and the S.sub.2 signal line from the resolver provides a positive or negative cosine value for the angular position of the motor shaft.

Detailed Description Text (12):
The resolver 26 can comprise a commercially available resolver or other resolver known in the art. Reference signals for the resolver 26 are provided by the motor controller 18.

Detailed Description Text (20):
The vector control board 46 comprises a microprocessor based digital and analog electronics system. As its primary function, the vector control board 46 receives driver-initiated acceleration and braking requests from the chassis controller 22. The vector control board 46 then acquires rotor position measurements from the resolver 26 and current measurements from the first and second power bridges 48 and 50, respectively, and uses these measurements to generate pulse width modulated (PWM) voltage waveforms for driving the first and second power bridges 48 and 50, respectively, to produce the desired acceleration or braking effects in the motor 28. The PWM voltage waveforms are generated in accordance with a control program which is designed to result in a requested torque output. As described above, the vector control board 46 also has the function of controlling the input filter and DC relay control unit 44, the oil pump unit 34, the radiator/fan 36, the battery charger 16, the input filter and DC relay control unit 44, built in test circuitry, vehicle communication, and fault detection. Additional details concerning the vector control board 46 are disclosed in copending U.S. patent application Ser. No. 08/258,295 (Westinghouse Case No. 58,295) entitled "FLAT TOPPING CIRCUIT;" copending U.S. patent application Ser. No. 08/258,306 (Westinghouse Case No. 58,337) entitled "VECTOR CONTROL BOARD FOR AN ELECTRIC VEHICLE PROPULSION SYSTEM MOTOR CONTROLLER"; copending U.S. patent application Ser. No. 08/258,305

(Westinghouse Case No. 58,338) entitled "DIGITAL PULSE WIDTH MODULATOR;" copending U.S. patent application Ser. No. 08/258,027 (Westinghouse Case No. 58,334) entitled "DIRECT COOLED IGBT MODULE;" and copending U.S. patent application Ser. No. 08/258,149 (Westinghouse Case No. 58,339) entitled "CONTROL MECHANISM FOR ELECTRIC VEHICLE" filed on the same day as this application. Additional details concerning the vector control board 46 are also disclosed in U.S. Pat. No. 5,291,388 entitled "RECONFIGURABLE INVERTER APPARATUS FOR BATTERY-POWERED VEHICLE DRIVE" issued on Mar. 1, 1994; U.S. Pat. No. 5,182,508 entitled "RECONFIGURABLE AC INDUCTION MOTOR DRIVE FOR A BATTERY-POWERED VEHICLE" issued on Jan. 26, 1993; U.S. Pat. No. 5,168,204 entitled "AUTOMATIC MOTOR TORQUE AND FLUX CONTROLLER FOR BATTERY-POWERED VEHICLE DRIVE" issued on Dec. 1, 1992; and U.S. Pat. No. 5,227,963 entitled "FLAT-TOP WAVEFORM GENERATOR AND PULSE-WIDTH MODULATOR USING SAME" issued on Jul. 13, 1993, which are hereby expressly incorporated by reference into this application.

Detailed Description Text (67):
While in drive mode (forward or reverse), the microprocessor 500 reads the converted accelerator and brake inputs and calculates a torque value for the motor controller 18. For safety, there are two accelerator and two brake inputs representing the position of the accelerator and brake pedals. In general, the microprocessor 500 calculates the difference between the two brake values and the difference between the two accelerator values. If the difference is within a specified tolerance, the average of the two is used. In the case of the accelerator inputs, if the difference is not within tolerance, the lower accelerator value is used. If the brake input difference is not within tolerance, the brake value is set to zero. The new brake and accelerator values are then used to generate a torque value for the motor controller 18. In drive forward, a positive torque value will accelerate the vehicle forward and a negative value will slow the vehicle through regenerative braking. In drive reverse, a vehicle torque value will accelerate the vehicle backward and a positive value will slow the vehicle.

Detailed Description Text (91):
Next, the microprocessor 500 determines whether the difference between the new state-of-charge value and the previously stored state-of-charge value is greater than a predetermined limit, or whether the store-SOC counter incremented in step 1540 has reached a predetermined limit (step 1550). This test is designed to determine whether (1) a predetermined time limit has been reached (for example, a value indicating that five minutes have elapsed since the last time the microprocessor 500 stored the state-of-charge value to its memory 505), or (2) the motor 28 is using a lot of current (that is, the discharge rate is high). In either case, the microprocessor 500 stores the new state-of-charge value to its memory 505 and resets that store state-of-charge counter (step 1560). After step 1560, the processing of the state-of-charge processing subcomponent is complete. Again, steps 1520 to 1560 are only executed by the microprocessor 500 after each half second, which is calculated using the state-of-charge counter. This is different from the store-SOC counter, which is used to calculate the appropriate time to store the new state-of-charge value in the memory 505. The chassis controller described above thus provides portability among various vehicle platforms. It also provides a communication link between a driver and the motor controller, translating driver inputs into commands for vehicle responses (e.g. brake and accelerator pedal positions into torque values).

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